IN THE CLAIMS

Please substitute the claim set in the appendix entitled Clean Version of Pending Claims for the previously pending claim set. The substitute claim set is intended to reflect cancellation of claims 9, 15, 21, 23 and 26, amendment of previously pending claims 1, 8, 14, 16-20, 22, 24, 27-31 and 73. The specific amendments to individual claims are detailed in the following marked up set of claims.

1. (Amended) A high power ultrasonic transducer comprising a housing having a predetermined geometry, means carried by the housing for providing power in excess of three kilowatts including a transducer having one or more active elements made from a giant magnetostrictive material and means for producing an electromagnetic field which extends through at least a portion of the one or more active elements, the one or more active elements each changeable between a first shape when in the absence of the electromagnetic field and a second shape when in the presence of the electromagnetic field, means for providing an electrical signal to the means for producing an electromagnetic field and an acoustic element connected to the transducer for channeling ultrasonic energy to perform work.

8. (Amended) The ultrasonic transducer of Claim 7 wherein the first and second flux return elements are first and second disk-like elements made from a material having an electrical resistivity [ranging from about 0.01 to 50] of at least about 0.01 ohm-cm and a magnetic saturation flux density [ranging from about 12,000 to 15,000] of at least about 8,000 gauss.

14. (Amended) The ultrasonic transducer of Claim 1 for use with a cooling fluid, the transducer including [means for providing] a passageway about the transducer adapted to receive the cooling fluid, the passageway formed from a material which is an electrical insulator.

16. (Amended) The ultrasonic transducer of Claim [15] 14 wherein the material has a thermal conductivity greater than about one (1) W/m-K.

17. (Amended) The ultrasonic transducer of Claim 14 wherein the [means for providing a] passageway is formed from hot pressed boron nitride.

18. (Amended) The ultrasonic transducer of Claim 14 wherein the [means for providing a] passageway [includes means for forming] is a helical passageway within the transducer.

19. (Amended) A high power ultrasonic transducer comprising a housing having a predetermined geometry, means carried by the housing for providing power in excess of three kilowatts including a transducer having a cylindrical actuation element made from a giant magnetostrictive material and a coil made from electrically conductive wire concentrically disposed about the cylindrical element for producing an electromagnetic field that extends through at least a portion of the cylindrical element, the cylindrical element changeable between a first shape when in the absence of the magnetic field and a second shape when in the presence of the magnetic field, means for supplying an electrical signal to the coil and an acoustic element connected to the transducer for vibrating at an ultrasonic frequency in response to the transducer for performing work.

20. (Amended) The ultrasonic transducer of Claim 19 further comprising means for actively cooling the transducer which includes [means for forming] a fluid-carrying [helical] passageway which extends about the transducer, wherein the passageway is an electrical insulator.

22. (Amended) The ultrasonic transducer of Claim 20 wherein the [means for forming a] fluid-carrying helical] passageway is a helical passageway that extends through the cylindrical element.

24. (Amended) A high power ultrasonic transducer comprising a housing having a predetermined geometry, a transducer having a rod-like element made from a giant magnetostrictive material and a coil made from electrically conductive wire concentrically disposed about the rod-like element changeable between a first shape when in the absence of the magnetic field and a second shape when in the presence of the magnetic field, tubular magnetic means concentrically disposed about the coil for biasing the rod-like element and having first and second opposite end portions and a central portion between the first and second end portions, the

first and second end portions having a radial thickness which is less than the radial thickness of the end portions, [means for supplying a sinusoidal electrical signal to the coil,] means for supplying a sinusoidal electrical signal to the coil, means for actively cooling the transducer which includes [means made from] an electrical insulator for forming a fluid-carrying [helical] passageway which extends about the transducer, the rod-like element having first and second ends, first and second flux return means carried by the housing adjacent the first and second ends of the rod-like element for capturing magnetic flux through the rod-like element and an acoustic element connected to the transducer for vibrating at an ultrasonic frequency in response to the transducer for producing useable work wherein the first and second flux return means are adjacent to the first and second end portions of the tubular magnetic means are made from a material having an electrical resistivity of at least about 0.01 ohm-cm and a magnetic saturation flux density of at least about 8,000 gauss.

27. (Amended) The ultrasonic transducer of Claim [26] 24 wherein the electrical insulator [means] for forming [a] the fluid-carrying [helical] passageway is [a made from] a ceramic material [selected from the group consisting of boron nitride, aluminum nitride, alumina, silicon carbide, boron carbide, titanium debarred, tungsten carbide, silicon nitride and spinel].

28. (Amended) The ultrasonic transducer of Claim [25] 27 wherein the [means for forming a fluid-carrying helical passageway] ceramic material is [made from a material] selected from the group consisting of boron nitride, aluminum nitride, alumina, silicon carbide, boron carbide, [titanium diboride, tungsten carbide,] silicon nitride, [spinel, pyrolitic graphite,] pyrolitic boron nitride, beryllia, [graphite and] silicon, and any combination thereof.

29. (Amended) A high power magnetostrictive ultrasonic actuator comprising an active element made from a giant magnetostrictive material having first and second ends, the giant magnetostrictive element changeable from a first shape to a second shape in the presence of a magnetic field, means for producing a magnetic field which extends through at least a portion of the active element and first and second flux return elements adjacent to the first and second ends

of the giant magnetostrictive element for capturing magnetic flux produced by said means and directing the magnetic flux through the giant magnetostrictive element.

30. (Amended) An actuator as in Claim 29 wherein the means for producing a magnetic field includes a coil concentrically disposed about the giant magnetostrictive element.

31. (Amended) An actuator as in Claim 29 further comprising a permanent magnet concentrically disposed about the giant magnetostrictive element for providing a Dc magnetic bias to the giant magnetostrictive element, the permanent magnet having first and second ends, the first and second flux return elements adjacent the first and second ends of the permanent magnet for capturing magnetic flux produced by the permanent magnet and directing said flux through the giant magnetostrictive element.

73. (Amended) The ultrasonic transducer of claim [1] 32 wherein the refrigeration system is a chiller system.

REMARKS

Applicant has carefully reviewed and considered the Office Action mailed on August 29, 2001, and the references cited therewith. Reconsideration and withdrawal of the rejection and objection of the claims of the above-identified application is respectfully requested. Claims 1, 8, 14, 16-20, 22, 24, 27-31 and 73. are amended and claims 9, 15, 21, 23 and 26 are canceled; as a result, claims 1-8, 10-14, 16-20, 22, 24-25 and 27-74 are now pending in this application.

Claims 9, 15, 21 and 23 and 26 are canceled solely to advance the prosecution of the present application, and without prejudice to their further prosecution in an appropriately filed continuing or divisional application.

The specification was amended to correct typographical errors. No new matter has been added as a result.

The claims have been amended to define Applicant's invention with greater particularity. The amendments to the claims have support throughout the specification. No new matter has been added as a result. The amendments are made to clarify the claims and are not intended to

limit the scope of equivalents to which any claim element may be entitled. Applicant respectfully requests reconsideration of the above-identified application in view of the amendments above and the remarks that follow.

Claims 1, 19, 24, 29-31 were amended to clarify that the magnetostrictive material is a giant magnetostrictive material as defined in the specification. Support for these amendments can be found at page 8.

Claims 8 and 24 were amended to recite an electrical resistivity of at least about 0.01 ohm-cm and a magnetic saturation flux density of at least about 8,000 gauss. Support for these amendments can be found in the specification at pages 15-16 and in original claims 8 and 26.

Claims 14, 17-18, 20, 22, 24, 27-28 were amended to clarify the term "passageway" and "electrical insulator" (claim 24) by removing the "means for" language. Other amendments include minor clarifications to provide consistent claim language and to remove a duplicate phrase in claim 24.

Claims 14, 18 and 20 were amended to clarify that the passageway is an electrical insulator Support for these amendments can be found in the specification at page 20, lines 22-23 and in original claims 15 and 21.

Claim 16 was amended to depend from claim 14 rather than from canceled claim 15.

Claims 20 and 24 were amended to clarify that the passageway is not necessarily helical. Claim 22 now recites the helical passageway. Support for these amendments can be found in the specification at page 20 and in original claim 14.

Claim 27 was amended to depend from claim 24 rather than from canceled claim 26 and to clarify that the passageway is a ceramic material. Support for these amendments can be found in the specification at page 21.

Claim 28 was amended to clarify the various types of ceramic materials that can be used. Support for these amendments can be found in original claim 27 and in the specification at page 21.

Claim 29 was amended to clarify that the actuator is a high power ultrasonic actuator. Support for this amendment can be found in original claims 1 and 19 and throughout the specification.

Claim 72 was amended to depend from claim 32 rather than claim 1.

§112 Rejection of the Claims

Claims 14-28 were rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

Claims 14 and 20 were rejected as the Examiner found the phrase "means for providing a passageway" unclear. As the Examiner has suggested, Applicant has removed this phrase from each claim. Reconsideration and withdrawal of these rejection is respectfully requested.

Claim 24 was rejected as the Examiner found the language "means. . . for forming a fluid-carrying helical passageway" is unclear. Applicant has removed this phrase from the claim. Additionally, the phrase "means for supplying a sinusoidal electrical signal to the coil" was noted as appearing twice. Applicant has removed the duplicate phrase from the claim. Reconsideration and withdrawal of this rejection is respectfully requested.

Claim 73 was rejected for lack of antecedent basis for the phrase "the refrigeration system." Applicant has amended claim 73 to depend from claim 32 rather than claim 1, as was intended. Reconsideration and withdrawal of this rejection is respectfully requested.

§103 Rejection of the Claims

Rejection of claims 1-3, 10 and 19

Claims 1-3, 10 and 19 were rejected under 35 USC § 103(a) as being unpatentable over Abramov et al. in view of Sutcliffe et al.

The Examiner states that Abramov et al discloses an ultrasonic transducer with either a magnetostrictive or piezoelectric transducer, but does not disclose power in excess of three kilowatts or the presence of an electromagnetic field. The Examiner further states that Abramov does mention using an ultrasonic device as a cleaning means and that since added power would mean more cleaning ability, it would have been obvious for one skilled in the art to increase power to increase cleaning ability. The Examiner further states that Sutcliffe discloses an electromagnetic field (not mentioned by Abramov) for a magnetostrictive actuator. The Examiner concludes that since both Abramov and Sutcliffe are from the same field of endeavor, it would have been obvious for one of ordinary skill in the art to have utilized an electromagnetic field producing coil in the magnetostrictive embodiment of Abramov because the device would

not work properly without one.

Applicant respectfully submits that the Examiner has not established the *prima facie* obviousness of the present claims. To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the cited references themselves or in the knowledge generally available to an art worker, to modify the reference or to combine reference teachings so as to arrive at the claimed invention. Second, the art must provide a reasonable expectation of success. Finally, the prior art reference must teach or suggest all the claim limitations. In re Ochiai, 37 USPQ2d 1127 (Fed. Cir. 1997) (When evaluating the scope of a claim, every limitation in the claim must be considered).

The claims as amended recite a high power ultrasonic transducer comprising a housing having a predetermined geometry, means carried by the housing for providing power in excess of three kilowatts including a transducer having one or more active elements made from a giant magnetostrictive material and means for producing an electromagnetic field which extends through at least a portion of the one or more active elements, the one or more active elements each changeable between a first shape when in the absence of the electromagnetic field and a second shape when in the presence of the electromagnetic field, means for providing an electrical signal to the means for producing an electromagnetic field and an acoustic element connected to the transducer for channeling ultrasonic energy to perform work.

Abramov discusses a low power device for transferring ultrasonic energy into a liquid or pasty medium with a magnetostrictive or piezoelectric transducer at frequencies of between 1 kHz and 100 kHz. As the Examiner notes, Abramov does not disclose a high power device. However, a "high power" device is much more than an ultrasonic device having "more power" as the Examiner has indicated. As is appreciated by those skilled in the art, design considerations are extremely complex for devices that function in excess of 3 kW output power as in Applicant's invention, let alone in excess of about 2 kW. Abramov does not teach or suggest the high power ultrasonic transducer recited in independent claims 1 and 19, as amended.

Furthermore, Sutcliffe does not overcome the deficiencies of the primary reference. Although Sutcliffe has an electromagnetic field, Sutcliffe is directed to active control of vibrations, a function inherently unnecessary in the ultrasonic range of Abromov. As a result, Applicant does not agree that the two references are in the "same field of endeavor" as the

Examiner has stated. Essentially, Sutcliffe's active vibration control device would be totally unnecessary in the Abromov device.

Motivation to combine the references must come from within the references themselves and can not be generated by "hindsight or reconstruction." In this instance, there is simply no suggestion or motivation, either in the cited references themselves or in the knowledge generally available to an art worker, to modify Abramov as described or to combine the reference teachings as suggested. Applicants note that Abramov is not concerned with the unique issues associated with a high power device and the vibrations actively controlled in Sutcliffe are inherently outside the range of the ultrasonic vibrations in Abramov. Clearly, the device in the primary reference and the device in the secondary reference are fundamentally different from each other and such critical differences must be recognized. In re Bond, 910 F.2d 831, 834, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990), *reh'g denied*, 1990 U.S. App. LEXIS 19971 (Fed. Cir. 1990).

There is also no reasonable expectation that the vibration controller would work in Abramov. In any case, the suggested combination does not teach each and every element of the claims as there is no means for providing power in excess of three kilowatts as recited in the claims, as amended. Even if the low power device of Abramov is assumed to have an electromagnetic field, this does not make Applicant's invention obvious. Applicant is not claiming to be the first to use an electromagnetic field. Applicant is the first, however, to provide a high power ultrasonic transducer comprising means for providing power in excess of three kilowatts and means for producing an electromagnetic field, as recited in claims 1 and 19.

There is simply no teaching or suggestion anywhere in the prior art to provide a high power ultrasonic transducer for providing power in excess of three kilowatts and means for producing an electromagnetic field. That knowledge has come from Applicant's own invention. Obviousness cannot be predicated on what is unknown. In re Spormann and Heinke, 150 U.S.P.Q. 449, 452 (CCPA 1966).

The Examiner also highlights Figure 2 in Sutcliffe and claim 2 of Applicant's application. The Examiner further highlights col. 4, lines 40-46 in Sutcliffe and claims 3 and 10 of Applicant's application. Applicant acknowledges the presence of a coil in Figure 2 of Sutcliffe and notes that column 4, lines 40-46 discusses a magnetic bias field. Again, Applicant is not claiming to be the first to use a coil nor a magnetic bias field and again reminds the Examiner of

the fundamental differences not only between Abramov and Sutcliffe, but between Applicant's invention and either of Abramov or Sutcliffe.

Furthermore, claims 2, 3 and 10 are dependent on claim 1 which has been amended as noted above. The additional limitations provided in dependent claims 2, 3 and 10 cannot by themselves be rendered obvious over the cited references if the independent claim from which it depends is determined to be nonobvious.

The references neither independently, or combined, contain each and every element of Applicants' claimed invention. Applicants respectfully submit that independent claims 1 and 19, as well as claims 2, 3, and 10 which depend from claim 1, are patentably distinct from Abramov et al in view of Sutcliffe, either alone or in combination. Claims 1-3, 10 and 19, as amended, each viewed as a whole, are not suggested by the cited references and not obvious under 35 U.S.C. 103. Reconsideration and withdrawal of this rejection is respectfully requested.

Rejection of claims 7, 29 and 30

Claims 7, 29 and 30 were rejected under 35 USC § 103(a) as being unpatentable over Abramov et al. in view of Sutcliffe et al as applied to claim 2 above, and further in view of Glass et al.

The Examiner states that Abramov (as modified by Sutcliffe) discloses an actuator but does not discuss flux return paths, and that Glass teaches that a flux return path reduces leakage and provides maximum use of available magnetization. The Examiner concludes that since the references are all from the same "field of endeavor" it would have been obvious to have utilized a flux return to provide maximum use of the available magnetization. The Examiner further highlights Figure 1 of Sutcliffe with respect to claim 30.

Applicant again respectfully submits that the Examiner has not established the *prima facie* obviousness of the present claims.

Glass describes a tunable fiber grating comprising a fiber grating secured to a magnetostrictive body. The device uses a conventional static return path made from iron.

In contrast, the return path in Applicant's invention is adapted to function in the ultrasonic frequency. Those skilled in the art would recognize that a return path made from iron would be ineffective in Applicant's device.

There is simply no suggestion or motivation, either in the cited references themselves or in the knowledge generally available to an art worker, to modify Abramov as described or to combine the reference teachings as suggested. Applicants note again that Abramov is not concerned with the unique issues associated with a high power device and the vibrations actively controlled in Sutcliffe are inherently outside the range of the ultrasonic vibrations in Abramov. Additionally, the iron return path of Glass would be ineffective in the ultrasonic range of Abramov. Clearly, the device in the primary reference and the devices in the secondary and tertiary references are fundamentally different from each other and such critical differences must be recognized. In re Bond, supra.

Applicant does not claim to have invented the first device using a flux return path or to recognize that flux return paths reduces leakage flux. Applicant is also not the first to use a coil as recited in claim 30. Applicant is the first however, to provide a magnetostrictive ultrasonic actuator comprising an active element made from a giant magnetostrictive material having first and second ends, the giant magnetostrictive element changeable from a first shape to a second shape in the presence of a magnetic field, means for producing a magnetic field which extends through at least a portion of the active element and first and second flux return elements adjacent to the first and second ends of the giant magnetostrictive element for capturing magnetic flux produced by said means and directing the magnetic flux through the giant magnetostrictive element, as recited in claim 29, as amended.

Furthermore, claim 7 is indirectly dependent on claim 1 and claim 30 is dependent on claim 29, both of which have been amended as noted above. The additional limitations provided in dependent claims 7 and 30 cannot by themselves be rendered obvious over the cited references if the independent claim from which it depends is determined to be nonobvious.

The references neither independently, or combined, contain each and every element of Applicants' claimed invention. Applicants respectfully submit that independent claims 1 and 29 as well as claims 7 and 30 which depend from claims 1 and 29 are patentably distinct from Abramov et al in view of Sutcliffe and Glass, either alone or in combination. Claims 7 and 29-30, as amended, each viewed as a whole, are not suggested by the cited references and not obvious under 35 U.S.C. 103. Reconsideration and withdrawal of this rejection is respectfully requested.

Rejection of claim 31

Claim 31 was rejected under 35 USC § 103(a) as being unpatentable over Abramov et al. as modified by Sutcliffe et al. and Glass et al. as applied to claim 29 above and further in view of Flateau et al. (Cited by applicant).

Applicant again respectfully submits that the Examiner has not established the *prima facie* obviousness of the present claims.

The Examiner states that Abramov as modified by Sutcliffe and Glass discloses the actuator but does not disclose a permanent magnet disposed around the actuator. The Examiner further states that Flateau discloses a permanent magnet 19 surrounding magnetostrictive element 12 as shown in Figure 1. The Examiner concludes that since Flateau and a modified Abramov are both from the same field of endeavor, it would have been obvious to use a permanent magnet to surround the magnetostrictive element in the modified Abramov in order to provide a more uniform magnetic biasing of the magnetostrictive element

Flateau describes a magnetostrictive vibration generation system known as a "shaker" that includes a cylindrical permanent magnet. However, such devices are known to be used for sonic frequencies and low power.

In contrast, Applicant's invention is a high power ultrasonic device as described above.

Again, there is simply no suggestion or motivation, either in the cited references themselves or in the knowledge generally available to an art worker, to modify Abramov as described or to combine the reference teachings as suggested for all of the reasons stated above. Clearly, the devices in each of the references cited are fundamentally different from each other and such critical differences must be recognized. In re Bond, supra.

Applicant does not claim to have invented the use of permanent magnets for biasing magnetostrictive elements. Applicant is the first however, to provide a magnetostrictive ultrasonic actuator comprising an active element made from a giant magnetostrictive material having first and second ends, the giant magnetostrictive element changeable from a first shape to a second shape in the presence of a magnetic field, means for producing a magnetic field which extends through at least a portion of the active element and first and second flux return elements adjacent to the first and second ends of the giant magnetostrictive element for capturing magnetic flux produced by said means and directing the magnetic flux through the giant magnetostrictive element, as recited in claim 29, as amended.

Furthermore, claim 31, which recites the actuator of claim 29 further comprising a permanent magnet is dependent on claim 29. The additional limitations provided in dependent claim 31 cannot by themselves be rendered obvious over the cited references if the independent claim from which it depends is determined to be nonobvious.

The references neither independently, or combined, contain each and every element of Applicants' claimed invention. Applicants respectfully submit that independent claim 29 as well as claim 31 which depends from claim 29 are patentably distinct from Abramov as modified by Sutcliffe and Glass, and further in view of Flateau, either alone or in combination. Claim 31, viewed as a whole, is not suggested by the cited references and not obvious under 35 U.S.C. 103. Reconsideration and withdrawal of this rejection is respectfully requested.

Rejection of claims 11-13

Claims 11-13 were rejected under 35 USC § 103(a) as being unpatentable over Abramov et al. in view of Sutcliffe et al. As applied to claim 1 above, and further in view of Slaughter et al.

Applicant again respectfully submits that the Examiner has not established the *prima facie* obviousness of the present claims.

The Examiner states that Abramov, as modified by Sutcliffe discloses an ultrasonic transducer but does not disclose using a material having a quarter resonant wavelength. The Examiner further states that Slaughter discloses an ultrasonic device having a quarter resonant wavelength. The Examiner concludes that since a modified Abramov and Slaughter are both from the same field of endeavor, it would have been obvious to utilize an element having a quarter resonant wavelength in order to size the element to vibrate at its resonant frequency when driven by a magnetostrictive device.

Slaughter describes a low power ultrasonic downhole radiator and method for using same.

Again, there is simply no suggestion or motivation, either in the cited references themselves or in the knowledge generally available to an art worker, to modify Abramov as described or to combine the reference teachings as suggested for all of the reasons stated above. Clearly, the devices in each of the references cited are fundamentally different from each other and such critical differences must be recognized.

Applicant does not claim to have invented the first device using a material having a quarter resonant wavelength. Applicant is the first however, to provide a high power ultrasonic transducer comprising a housing having a predetermined geometry, means carried by the housing for providing power in excess of three kilowatts including a transducer having one or more active elements made from a giant magnetostrictive material and means for producing an electromagnetic field which extends through at least a portion of the one or more active elements, the one or more active elements each changeable between a first shape when in the absence of the electromagnetic field and a second shape when in the presence of the electromagnetic field, means for providing an electrical signal to the means for producing an electromagnetic field and an acoustic element connected to the transducer for channeling ultrasonic energy to perform work, as recited in claim 1, as amended.

Furthermore, claims 11-13 are dependent on claim 1. The additional limitations provided in dependent claims 11-13 cannot by themselves be rendered obvious over the cited references if the independent claim from which it depends is determined to be nonobvious.

The references neither independently, or combined, contain each and every element of Applicants' claimed invention. Applicants respectfully submit that independent claim 1 as well as claims 11-13 which depend from claim 1 are patentably distinct from Abramov et al in view of Sutcliffe as applied to claim 1, and further in view of Slaughter, either alone or in combination. Claims 11-13, as amended, each viewed as a whole, are not suggested by the cited references and not obvious under 35 U.S.C. 103. Reconsideration and withdrawal of this rejection is respectfully requested.

Rejection of claims 14, 18 and 20

Claims 14, 18 and 20 were rejected under 35 USC § 103(a) as being unpatentable over Abramov et al. As modified by Sutcliffe et al. as applied to claim 1 above, and further in view of Adames.

Applicant again respectfully submits that the Examiner has not established the *prima facie* obviousness of the present claims.

The Examiner states that Abramov as modified by Sutcliffe discloses a transducer but does not disclose a passageway about the transducer for receiving cooling fluid. The Examiner

also states that Adames teaches liquid cooling of an electrodynamic machine in Figure 1. The Examiner concludes that since Adames and a modified Sutcliffe are both from the same field of endeavor, it would have been obvious to utilize a cooling passageway in the modified Abramov in order to increase the efficiency of the machine.

Adames describes electrical motor housings with integrated heat removal facilities. Those skilled in the art would recognize that electric motors are are non-resonant. As a result, electric motors inherently cannot operate in the ultrasonic frequency range. Adames is not seeking to solve the same problem as in Applicant's invention, since its low frequency operation does not involve the generation of eddy currents. As a result, Adames does not use any type of non-conductive material in the cooling channels.

In contrast, the in Applicant's invention is adapted to function in the ultrasonic frequency. Furthermore, the cooling channels are electrically nonconductive, i.e., are electrical insulators, to reduce the effect of eddy current generation as recited in the claims 14, 18 and 20, as amended.

Again, there is simply no suggestion or motivation, either in the cited references themselves or in the knowledge generally available to an art worker, to modify Abramov as described or to combine the reference teachings as suggested for all of the reasons stated above. Clearly, the devices in each of the references cited are fundamentally different from each other and such critical differences must be recognized.

Applicant does not claim to have invented the first device using a cooling passageway. Applicant is the first however, to provide the devices recited in claims 1 and 19, as amended.

Furthermore, claims 14 and 18 are dependent on claim 1 and claim 20 is dependent on claim 19. The additional limitations provided in dependent claims 14, 18 and 20 cannot by themselves be rendered obvious over the cited references if the independent claim from which it depends is determined to be nonobvious.

The references neither independently, or combined, contain each and every element of Applicants' claimed invention. Applicants respectfully submit that independent claims 1 and 19 as well as claims 14, 18 and 20 which depend from claims 1 and 19 are patentably distinct from each reference, either alone or in combination. Claims 14, 18 and 20, as amended, each viewed as a whole, are not suggested by the cited references and not obvious under 35 U.S.C. 103. Reconsideration and withdrawal of this rejection is respectfully requested.

Rejection of claims 15-17 and 21

Claims 15-17 and 21 were rejected under 35 USC § 103(a) as being unpatentable over Abramov et al. As modified by Sutcliffe et al. and Adames as applied to claim 14 above, and further in view of Avakian et al. and Rusanova et al. Claims 15 and 21 have been canceled, rendering this rejection moot.

Applicant again respectfully submits that the Examiner has not established the *prima facie* obviousness of the present claims.

The Examiner states that Abramov as modified by Sutcliffe and Adames discloses a transducer with a cooling passageway but does not disclose a passage way formed from an electrical insulator. The Examiner also states that Adames teaches using a cooling tube made from stainless steel which is thermally conductive and corrosion resistant. The Examiner also states that Avakian also mentions electrical isolation and that Rusanova teaches using hot, pressed boron nitride. The Examiner concludes that since Rusanova suggests using hot pressed boron nitride in electrical devices and since the material satisfies the requirements for coolant tuibing in an electrical motor it would have been obvious to utilize boron nitride coolant tubes in a modified Abramov. The Examiner further highlight claim 16, noting that boron nitride has a thermal conductivity greater than one w/m-K.

Avakian describes a sonic low power stator cooling assembly. The base material of the fluid passageways in Avakian is electrically conductive, with only a thin film of non-conductive material sprayed onto it.

Rusanova teaches that boron nitride can be used as a thermally conductive material.

In contrast, the fluid passageway in Applicant's invention is made from an electrically nonconductive material, as recited in the claims, as amended, in order to prevent performance degradation due to eddy current generation. Boron nitride, in addition to being thermally conductive, is also known to be electrically nonconductive.

Again, there is simply no suggestion or motivation, either in the cited references themselves or in the knowledge generally available to an art worker, to modify Abramov as described or to combine the reference teachings as suggested for all of the reasons stated above. Clearly, the devices in each of the references cited are fundamentally different from each other and such critical differences must be recognized.

Applicant does not claim to have invented the first device using a passageway formed from an electrical insulator nor the first to use boron nitride in electrical devices. Applicant is the first however, to provide the devices recited in claims 1 and 19, as amended.

Furthermore, claims 16-17 are dependent on claim 1, which has been amended as noted above. The additional limitations provided in dependent claims 16-17 cannot by themselves be rendered obvious over the cited references if the independent claim from which it depends is determined to be nonobvious.

The references neither independently, or combined, contain each and every element of Applicants' claimed invention. Applicants respectfully submit that independent claims 1 and 19 as well as claims 16-17 which depend from claims 1 and 19 are patentably distinct from the references, either alone or in combination. Claims 16-17, as amended, each viewed as a whole, are not suggested by the cited references and not obvious under 35 U.S.C. 103. Reconsideration and withdrawal of this rejection is respectfully requested.

Allowable Subject Matter

Claims 4-6, 8, 9 and 22-28 were objected to as being dependent upon a rejected base claim, but were indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The base claims from which these claims depend have been amended. Claims 9, 23 and 26 have been canceled. Applicants submit that all of the claims are now in condition for allowance. Reconsideration and withdrawal of this objection is respectfully requested.

Claims 32-72 and 74 are allowed.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney 612-515-233-3865 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,
THOMAS T. HANSEN ET AL.
By their Representatives,
SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(515) 233-3865

Date December 21, 2001 By Barbara J. Clark
Barbara J. Clark
Reg. No. 38,107

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Commissioner of Patents, Washington, D.C. 20231, on this 21 day of December, 2001.

Name Signature